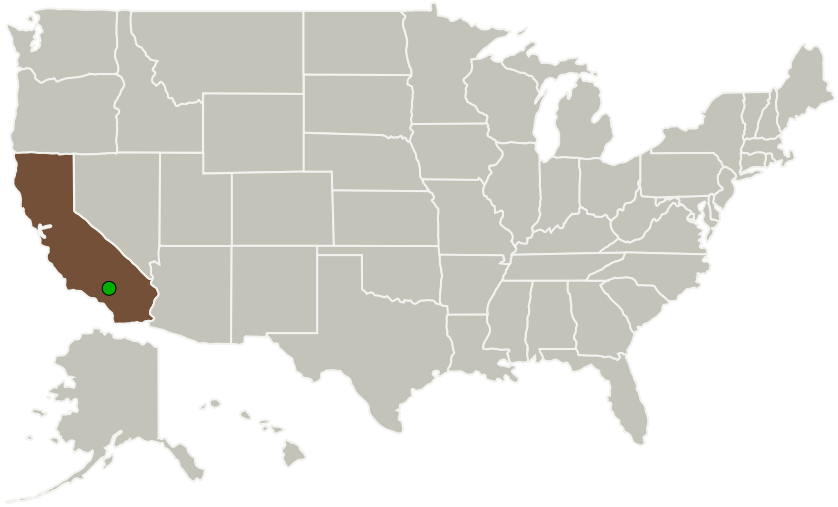
Self-Nulling Schlieren Imaging for Aircraft in Flight, Phase I

Completed Technology Project (2015 - 2015)

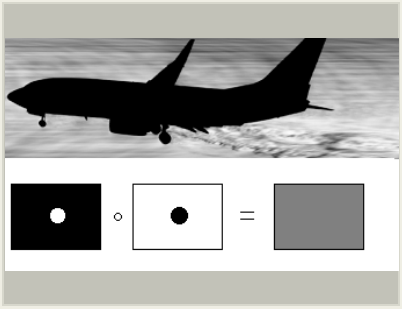
Project Introduction

Schlieren imaging is an especially useful tool for studying shock waves created by aircraft, because shock waves create strong refractive index gradients that can be visualized. Until recently, the large and delicate instrumentation required for schlieren photography mostly restricted the technique's use to ground test facilities. Previous work has shown that full-scale schlieren images of an aircraft in flight can be synthesized by analyzing high-speed video of the aircraft flying across the sun. The solar schlieren method is especially useful for air-to-air schlieren photography, because an airborne observation platform provides a unique perspective view of the second aircraft. We propose to advance this technique via a new self-nulling schlieren imaging method which has the potential to substantially increase the sensitivity of the technique. This technology could be also used to study large-scale aerodynamic problems where conventional laboratory schlieren imaging is impossible.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Spectabit Optics, LLC	Lead Organization	Industry	Laguna Hills, California
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California



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Primary U.S. Work Locations

California

Project Transitions

June 2015: Project Start

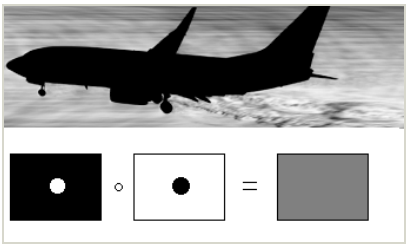
December 2015: Closed out

Closeout Summary: Self-Nulling Schlieren Imaging for Aircraft in Flight, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139433)*

Images



Briefing Chart Image
Self-Nulling Schlieren Imaging for Aircraft in Flight, Phase I *(https://techport.nasa.gov/image/134588)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Spectabit Optics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

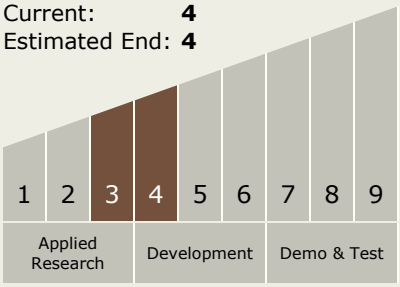
Carlos Torrez

Principal Investigator:

Benjamin D Buckner

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.1 Mechanical/Structural Integrity Testing

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System